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EXAMINER				
BARTON, JEFFREY THOMAS				
ART UNIT		PAPER NUMBER		
1795				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/799,043

Applicant(s)

HASHIMOTO ET AL.

Examiner

Jeffrey T. Barton

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/5508)
Paper No(s)/Mail Date 20080307
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The amendment filed on 14 January 2008 does not place the application in condition for allowance.

Status of Rejections Pending Since the Office Action of 12 October 2007

2. The rejections of claim 5 are obviated by cancellation of the claim.
3. All other rejections are maintained.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
8. Claims 1-4 and 6-9 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Negami et al. Supporting evidence is provided by Sheng et al.

Regarding claim 1, Negami et al disclose a solar cell (Figure 2) comprising first (12) and second (15) electrode layers as claimed, a p-type semiconductor layer (13) disposed between the first and second electrode layers, and a layer (14) disposed between the p-type semiconductor layer and second electrode layer, wherein layer 14 comprises Zn, O, and at least one of Be, Mg, Ca, Sr, and Ba. (Column 5, lines 3-51; note column 5, lines 46-51 specifically regarding layer 14) Selection of two of the alkaline earth elements, including magnesium and any among calcium, strontium, and barium meets the limitations of instant claim 1. Within the options present within "an

oxide expressed by the general formula $Zn_{1-x}A_xO$, wherein A is at least one selected from Be, Mg, Ca, Sr, and Ba" disclosed by Negami et al, 14 out of 31 possible permutations (i.e. any single listed metal, any pair of listed metals, any three listed metals, etc.) meet the instant limitation requiring magnesium and at least one selected from Ca, Sr, Ba, Al, In, and Ga. This is believed to be a sufficient basis for considering the claims anticipated by Negami et al. In addition, Negami et al disclose the subscript X ranging from 0-1, which overlaps the claimed range of composition.

Regarding claim 2, Negami et al list Ca, Sr, and Ba as constituents.

Regarding claim 3, Negami et al disclose that element A is present at levels as low as 0.1 at % (Column 5, lines 50-51), which will lead to Ca, Sr, or Ba levels overlapping the claimed range.

Regarding claim 4, the film 14 disclosed at Column 5, lines 46-51 of Negami et al have 0 atomic percent Al, In, and Ga.

Regarding claim 6, Sheng et al disclose $Zn_{1-x}Mg_xO$ film resistivities that are more than 10 orders of magnitude below that required by the claim. (Table 1) Films taught by Negami et al that include further minor amounts of Ca, Sr, or Ba would have resistivities as claimed. Note also MPEP §2112, which states in part that "[t]he discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer." *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999). Thus the claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily

make the claim patentable. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977) There is no difference between the structure taught by Negami et al and that instantly claimed. Therefore, the claimed property is considered to be present in the prior art structure.

Regarding claim 7, Negami et al disclose the p-type semiconductor layer 13 comprising copper, indium, gallium, and either selenium or sulfur. (Column 5, lines 17-25)

Regarding claim 8, Negami et al disclose an n-type layer 13a lying between the p-type layer 13 and oxide 14, wherein the n-type layer comprises copper, indium, and selenium. (Column 5, lines 30-34) Since layer 13a is deposited adjacent Zn-containing layer 14, there will be a finite amount of diffusion of zinc into this layer 13a, meeting the limitations to the claim. This is particularly the case since oxide layers 14 and 15 are conventionally deposited at elevated temperatures that increase the rate of diffusion.

Regarding claim 9, Negami et al disclose the first electrode layer 12 being made of molybdenum (Column 5, lines 15-16), and the second electrode 15 being a transparent conductor. (Column 5, lines 64-67)

Since Negami et al teach all limitations of the instant claims, the reference is deemed to be anticipatory.

Note *In re Schaumann*, 197 USPQ 5, concerning the question of obviousness of claims to a species that is present within a small genus disclosed by the prior art. It is the Examiner's position that if it is held that the disclosure of Negami et al is too broad to anticipate instant claim 1, the claim is still rendered obvious by the reference, due to

the suggestion that more than one of elements Be, Mg, Ca, Sr, and Ba be included in zinc oxide film 14 as disclosed at Column 5, lines 46-51.

In addition, specific to claim 6, the claimed conductivity would obviously have been present once the product of Negami et al is provided.

In addition, specific to claim 8, the claimed n-type layer comprising Zn, at least one element selected from Cu, In, and Ga, and at least one element selected from Se and S would obviously have been present once the product of Negami et al is provided.

Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 U.S.C. §103 in addition to the rejection made above under 35 U.S.C. §102.

Response to Arguments

9. Applicant's arguments filed 14 January 2008 have been fully considered but they are not persuasive.

Applicant argues that the oxide of Negami et al does not meet the requirements of the instant formula, since the presence of more than one of the disclosed elements Be, Mg, Ca, Sr, and Ba would lead to the amount of Mg in the oxide to not correspond to that claimed. This is not persuasive, because Negami et al show several examples with the claimed Zn:Mg:O ratio (e.g. in Figure 9), and the replacement of a small amount of Mg with another element, as disclosed by Negami et al, would not significantly alter the elemental ratio. Furthermore, it is well known in the field of thin film deposition using vapor deposition techniques that the amount of oxygen in an oxide

film can vary significantly from the expected stoichiometric ratio. For instance, oxygen deficiency is commonly present in films containing significant nitrogen or other anionic impurities. The presence of such a reduced amount of oxygen would also obviously lead to the ratio meeting the claim limitation, even with the presence of a significant amount of a second chalcogen in the film.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art
Unit 1753

JTB
17 March 2008